

Photos by David Hansen

On the left, a healthy American Elm stands in Shoreview, while on the right, Robert Blanchette and Benjamin Held examine a tree stricken with Dutch Elm Disease in St. Paul that has been scheduled for removal.

Quick—picture the quintessential American tree-lined street, one you'd see in an old movie. It's summer, and kids ride their bicycles down the road toward the park, playing cards slapping the spokes as they pass. Along that street you're likely picturing, elm trees tower 100 feet tall on either side.

That perfect vista is increasingly a thing of the past.

Those vast shady arches have been dwindling from the landscape for decades, ever since Dutch Elm Disease (DED) arrived in the United States in the '30s and spread to Minnesota in the '70s. A fungal disease spread by bark beetles, DED continues to ravage the American elm, an otherwise hardy, fast-growing shade tree. And yet, among the scores of dead and dying elms, a few trees have stood for generations—and continue to thrive.

A team of scientists in CFANS is working to track down those lone survivors to find out whether they actually are resistant to the disease or if they simply have escaped infection. The project has been funded by the Minnesota Turf and Grounds Association and has secured a grant from the Legislative-Citizen Committee on Minnesota Resources to identify DED-resistant American, red and rock elm varieties for commercial release.

"It does look like there is resistance out there," says Department of Plant Pathology professor Robert Blanchette. "We don't have too many trees to study, but there are a few and we'll find more with this project. These trees are selected for testing because they survive where most elms die. Not all of them survive inoculation but a few of them are looking very good."

The process of testing for resistance is time consuming. Once a potentially resistant tree is identified, the team collects branches that forest resources scientist Chad Giblin ('01-B.S.; '13-M.S.) propagates into hundreds of clones. After three years of growth in the greenhouse, the clones are inoculated with spores of the DED fungus. If the clones survive, they get transplanted into the field, where they mature another two to three years before a second round of inoculation.

SURVIVORS ON ELM STREET

By
Sara
Specht

A handful of trees may hold the key to disease resistance

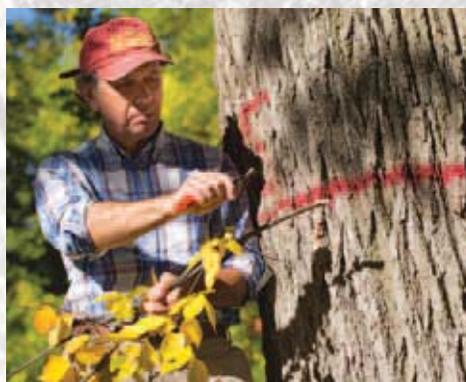
“A susceptible variety will die completely and really quickly,” Giblin says. But one promising variety tested so well the team has applied for a patent for future release. “Inoculated side by side, a wild American elm is dead after two or three weeks, but this new variety shows a little bit of wilt, and then it recovers and lives on.”

What isn’t clear is why certain American elms—only an estimated one in 100,000—can tolerate DED.

“It’s not like resistant trees are disease-free,” says plant pathologist Benjamin Held (’98–B.S.; ’13–Ph.D.), who is analyzing the defense mechanisms of the trees that survive inoculation. “They do have some level of symptoms from the disease. We think they’re more efficient at walling off the pathogen and keep growing once they get it. Currently we don’t understand how but we have started investigations to find out.”

Held is trying to identify any differences between resistant and susceptible trees, from the structure of a tree’s vascular system—the DED fungus spreads through these vessels—or the anatomy of its wood to chromosomal variations. He hopes that identifying defense mechanisms will help the team screen for new resistant trees.

For now, finding new elms to study is a matter of collaborating with people in the area who might have seen a surviving tree in disease-ridden areas, Giblin says. “We have partners throughout the state—urban foresters, arborists, even homeowners—who will identify trees they’ve



Left: Blanchette cuts some branches from an elm in St. Paul that received expensive chemical treatment for years to protect it from DED, but four years ago the homeowner decided it was too expensive. The tree has been infected and is now scheduled for removal. Right: Held examines samples from surviving elms to determine resistance mechanisms.



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watched for a generation or more. One trained arborist brought us samples from a sole survivor, and that’s what kicked off the program.”

That master arborist was Mark Stennes, a graduate of the university (’75–B.S.; ’81–M.S.) and a plant pathologist with S&S Tree Specialists in 1997, when he discovered a massive, flourishing 100+ year-old elm among a field of infected trees in Afton, Minn. He encouraged Blanchette to seek funding to study it. The variety has been named the St. Croix Elm, and after years of testing it is slated for commercial release by Bailey Nursery in 2015. Two of the trees have been planted already on the grounds of the state Capitol, and another will be planted in Stennes’ honor at the Minnesota State Fairgrounds.

Stennes says he chose to study plant pathology in the late ’70s because of the DED epidemic, so he’s proud to help bring a resistant American elm back into the landscape. “I don’t buy lottery tickets, but the St. Croix was me winning the lottery. It seems bulletproof. They bring it up and infect it with Dutch Elm Disease over and over, and it gets sick, but then it gets better. This tree just takes your breath away—it’s the perfect tree for a shady

street, and it would grow out of a crack in the sidewalk if you let it.”

It is that hardiness that drives the research focus onto American elms in particular. Several Asian elm varieties have shown considerable resistance to DED, but they are not as well suited to the Minnesota climate.

“We want a tree that is winter hardy and will grow here,” he says. “So we’re focusing on our native trees. They’re practical and they grow fast. The only reason we don’t have them anymore is this disease, and this is a time when we need some good urban shade trees for planting.”

The project’s ultimate goal is to identify, test and release several resistant varieties of elm, with possibly different mechanisms of resistance for the best chances of survival if the disease mutates. If the new varieties find commercial success, the team hopes that those towering arches will return to the cityscape.

“If you’ve ever seen these giant elms on the side of the street, the shade they produce, their shape,” says Held, “they’re just so well-suited to the environment. There’s nothing else like them.” ■



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Photos courtesy Benjamin Held

Left: Chad Giblin stands with a potentially DED-resistant elm variety that survived inoculation tests in the greenhouse and has been moved to the field for further testing.

Center and right: A healthy clone of the St. Croix elm (left) stands beside one that has been inoculated with DED. It shows some signs of wilt but is recovering, unlike the inoculated wild elm on the far right, which will succumb to the disease.